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<i>Kevin Kuo</i>		ISSUE : JAN.11, 2018
APPROVED BY:		TOTAL PAGE : 31
<i>Chris Wu</i>		VERSION : 1

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :  
ETM043010EDH6  
 (RoHS)  
 FOR MESSRS :  
 \_\_\_\_\_

CUSTOMER'S APPROVAL

DATE :

\_\_\_\_\_

BY :

\_\_\_\_\_

EMERGING DISPLAY  
TECHNOLOGIES CORPORATION

MODEL NO.	VERSION	PAGE
ETM043010EDH6	1	0-1

RECORDS OF REVISION

DOC . FIRST ISSUE

JAN.11, 2018

DATE	REVISED PAGE NO.	SUMMARY
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1. GENERAL SPECIFICATIONS

1.1 DATA SHEETS FOR CONTROLLER/DRIVER  
PLEASE REFER TO :

SITRONIX ST7282

1.2 DATA SHEET FOR CAPACITIVE TOUCH PANEL CONTROLLER/DRIVER  
PLEASE REFER TO :

HYCON HY4614

1.3 MATERIAL SAFETY DESCRIPTION  
ASSEMBLIES SHALL COMPLY WITH EUROPEAN ROHS REQUIREMENTS,  
INCLUDING PROHIBITED MATERIALS/COMPONENTS CONTAINING LEAD,  
MERCURY, CADMIUM, HEXAVALENT CHROMIUM, POLYBROMINATED  
BIPHENYLS (PBB) AND POLYBROMINATED  
DIPHENYL ETHERS (PBDE)

2. MECHANICAL SPECIFICATIONS

2.1 LCD MODULE MECHANICAL SPECIFICATIONS

( 1 ) DIAGONALS -----	4.3 inch
( 2 ) NUMBER OF DOTS -----	480W * (RGB) * 272H DOTS
( 3 ) MODULE SIZE -----	105.5W * 67.2H * 5.36D mm (NOT INCLUDED FPC)
( 4 ) VIEWING AREA -----	97W * 56H mm
( 5 ) ACTIVE AREA -----	95.04W * 53.856H mm
( 6 ) DOT SIZE -----	0.066W * 0.198H mm
( 7 ) PIXEL PITCH -----	0.198W * 0.198H mm
( 8 ) LCD TYPE -----	TFT , TRANSMISSIVE
( 9 ) COLOR -----	16.7M
( 10 ) VIEWING DIRECTION -----	6 O'CLOCK (GRAY LEVEL INVERSION)
( 11 ) BACK LIGHT -----	LED , COLOR : WHITE
( 12 ) INTERFACE MODE -----	RGB(24 BIT ) PARALLEL

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## 2.2 CAPACITIVE TOUCH PANEL MECHANICAL SPECIFICATIONS

- ( 1 ) TOUCH PANEL SIZE ----- 4.3 inch
- ( 2 ) OUTER DIMENSION ----- 103.1W \* 65.4H \* 1.25D mm  
(NOT INCLUDED FPC)
- ( 3 ) VIEWING AREA ----- 97W \* 56H mm
- ( 4 ) ACTIVE AREA ----- 96W \* 55H mm
- ( 5 ) INPUT TYPE ----- MULTI TOUCH
- ( 6 ) NUMBER OF TOUCH SENSOR ----- 20\*12 SENSORS
- ( 7 ) RESOLUTION ----- 1280 \* 768
- ( 8 ) INTERFACE MODE ----- I2C

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### 3. ABSOLUTE MAXIMUM RATINGS

#### 3.1 LCD MODULE ELECTRICAL ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER VOLTAGE	VCC-VSS	-0.3	4.6	V	VSS=0
LED BACKLIGHT POWER DISSIPATION	PO	—	(1020)	mW	
LED BACKLIGHT FORWARD CURRENT	IF	—	(25)	mA	

#### 3.2 CAPACITIVE TOUCH PANEL ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY FOR DRIVER	VDD-GND	-0.2	4.0	V	
INPUT VOLTAGE	VIN	-0.2	4.0	V	

#### 3.3 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	-20°C	70°C	-30°C	80°C	NOTE ( 1 ) , ( 2 )
HUMIDITY	NOTE ( 3 )		NOTE ( 3 )		WITHOUT CONDENSATION
VIBRATION	—	2.45 m/s <sup>2</sup> ( 0.25 G )	—	11.76 m/s <sup>2</sup> ( 1.2 G )	10~55Hz X, Y, Z, EACH 2HRS
SHOCK	—	29.4 m/s <sup>2</sup> ( 3 G )	—	490 m/s <sup>2</sup> ( 50 G )	6 ms XYZ DIRECTIONS 3 TIMES EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE ( 1 ) : Ta AT -30°C : 48HRS MAX.  
80°C : 168HRS MAX.

NOTE ( 2 ) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT  
TEMPERATURE THIS PHENOMENON IS REVERSIBLE.

NOTE ( 3 ) : Ta ≤ 60°C : 90%RH MAX (96HRS MAX).

Ta > 60°C : ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY  
OF 90%RH AT 60°C (96HRS MAX).

#### 4. ELECTRICAL CHARACTERISTICS

##### 4.1 TFT MODULE ELECTRICAL CHARACTERISTICS

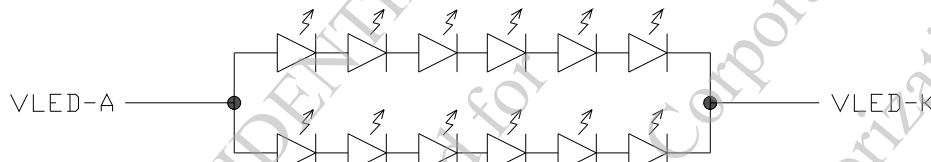
Ta = 25 °C

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY	VCC-VSS	—	3.0	3.3	3.6	V	
OPERATING CURRENT	ICC	—	—	(20)	(35)	mA	
INPUT LOW VOLTAGE	V <sub>IL</sub>	—	0	—	0.3*VCC	V	NOTE ( 1 )
INPUT HIGH VOLTAGE	V <sub>IH</sub>	—	0.7*VCC	—	VCC	V	NOTE ( 1 )
POWER SUPPLY FOR LED BACKLIGHT	VF	IF=40mA	(16.8)	(19.2)	(20.4)	V	NOTE ( 2 )
LED LIFE TIME	—	I <sub>LED</sub> =20mA (PER LED)	(30K)	—	—	hrs	NOTE ( 3 ) NOTE ( 4 )

NOTE ( 1 ) : THE DISPLAY PATTERN IS ALL "WHITE".

NOTE ( 2 ) : APPLIED TO TERMINALS R0~R7, G0~G7, B0~B7, CLK, DISP, HS, VS.

NOTE ( 3 ) : INTERNAL CIRCUIT DIAGRAM OF BACKLIGHT



NOTE ( 4 ) : CONDITIONS; TA=25 °C, CONTINUOUS LIGHTING

NOTE ( 5 ) : DEFINITIONS OF LIFE TIME :

LCM LUMINANCE BECOMES HALF OF THE INITIAL VALUE.

##### 4.2 CAPACITIVE TOUCH PANEL ELECTRICAL CHARACTERISTICS

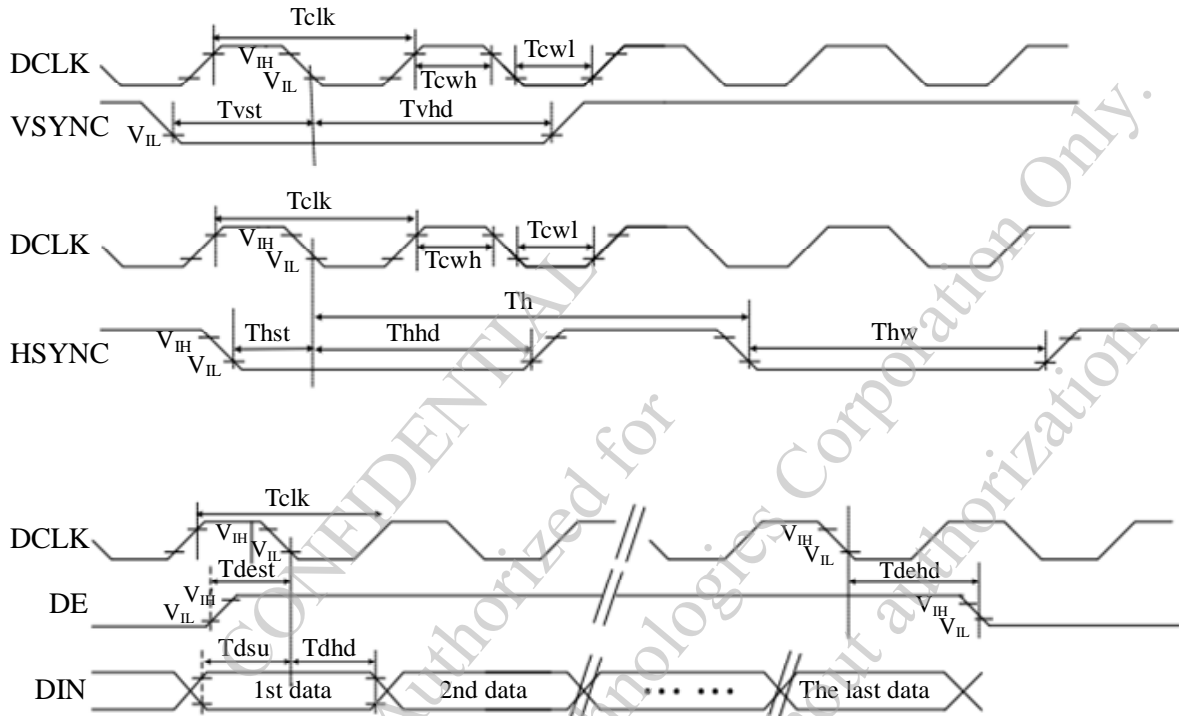
Ta=25°C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY FOR DRIVER	VDD-GND	—	2.8	3.3	3.6	V
INPUT HIGH LEVEL VOLTAGE	V <sub>IH</sub>	—	—	0.7VDD	—	V
INPUT LOW LEVEL VOLTAGE	V <sub>IL</sub>	—	—	0.3VDD	—	V
OUTPUT HIGH LEVEL VOLTAGE	V <sub>OH</sub>	I <sub>OH</sub> =10mA	VDD-0.3	—	—	V
OUTPUT LOW LEVEL VOLTAGE	V <sub>OL</sub>	I <sub>OH</sub> =-10mA	—	—	GND+0.3	V
POWER SUPPLY CURRENT CONSUMPTION FOR OPERATION	IDD	VDD-GND=3.3V	—	10	15	mA

5. TIMING CHART

5.1 FOR LCD MODULE

5.1.1 CLOCK AND DATA INPUT TIMING DIAGRAM



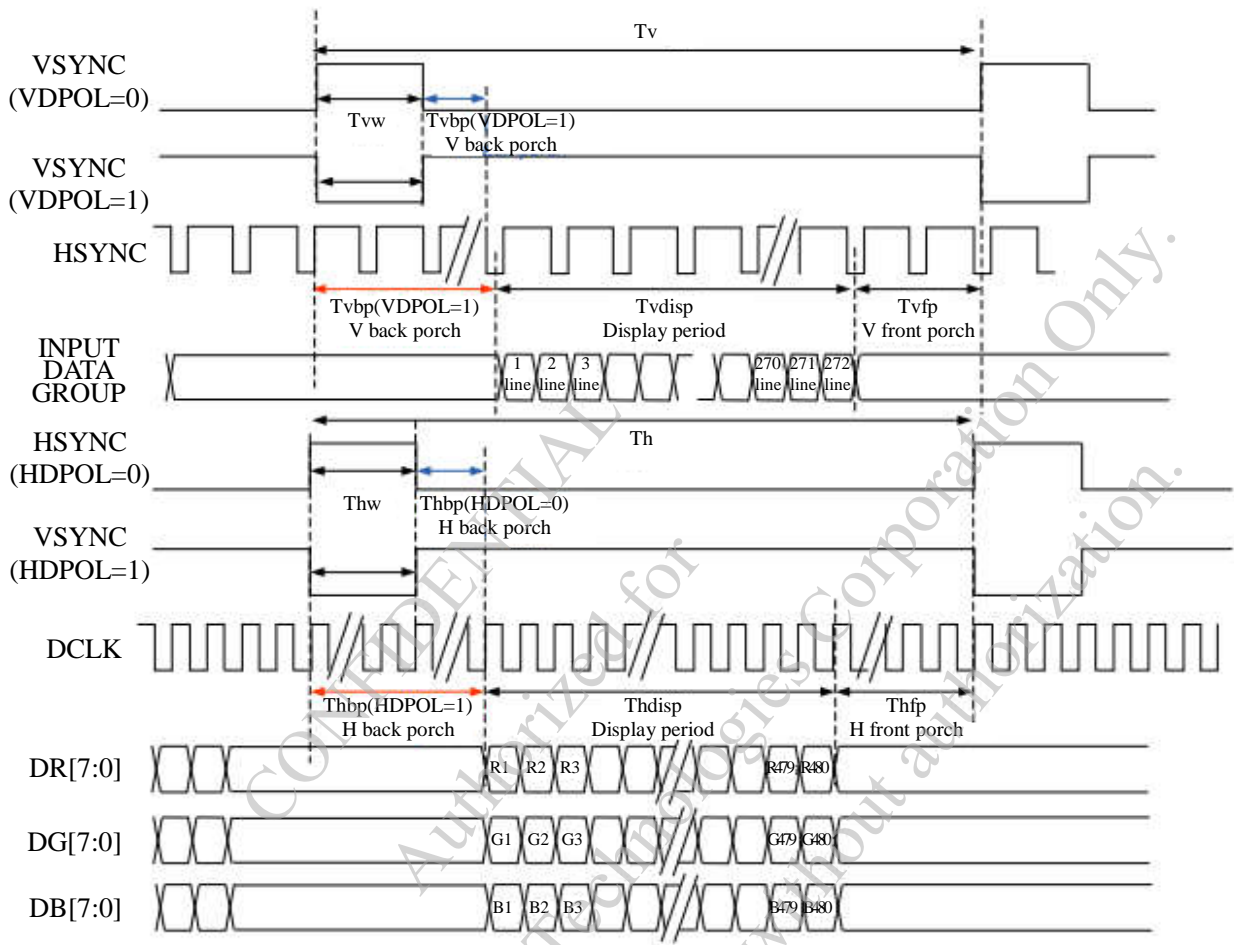
5.1.2 PARALLEL 24-BIT RGB TIMING TABLE

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK	
DCLK FREQUENCY	Fclk	8	9	12	MHz		
DCLK PERIOD	Tclk	83	111	125	ns		
HSYNC	PERIOD TIME	Th	485	531	598	DCLK	
	DISPLAY PERIOD	Thdisp	—	480	—	DCLK	
	BACK PORCH	Thbp	3	43	43	DCLK	BY H_BLANKING SETTING
	FRONT PORCH	Thfp	2	8	75	DCLK	
	PULSE WIDTH	Thw	2	4	75	DCLK	
VSYNC	PERIOD TIME	Tv	276	292	321	H	
	DISPLAY PERIOD	Tvdisp	—	272	—	H	
	BACK PORCH	Tvbp	2	12	12	H	BY V_BLANKING SETTING
	FRONT PORCH	Tvfp	2	8	37	H	
	PULSE WIDTH	Tvw	2	4	37	H	

NOTE : IT IS NECESSARY TO KEEP Tvbp= 12 AND Thbp=43 IN SYNC MODE. DE MODE IS UNNECESSARY TO KEEP IT.

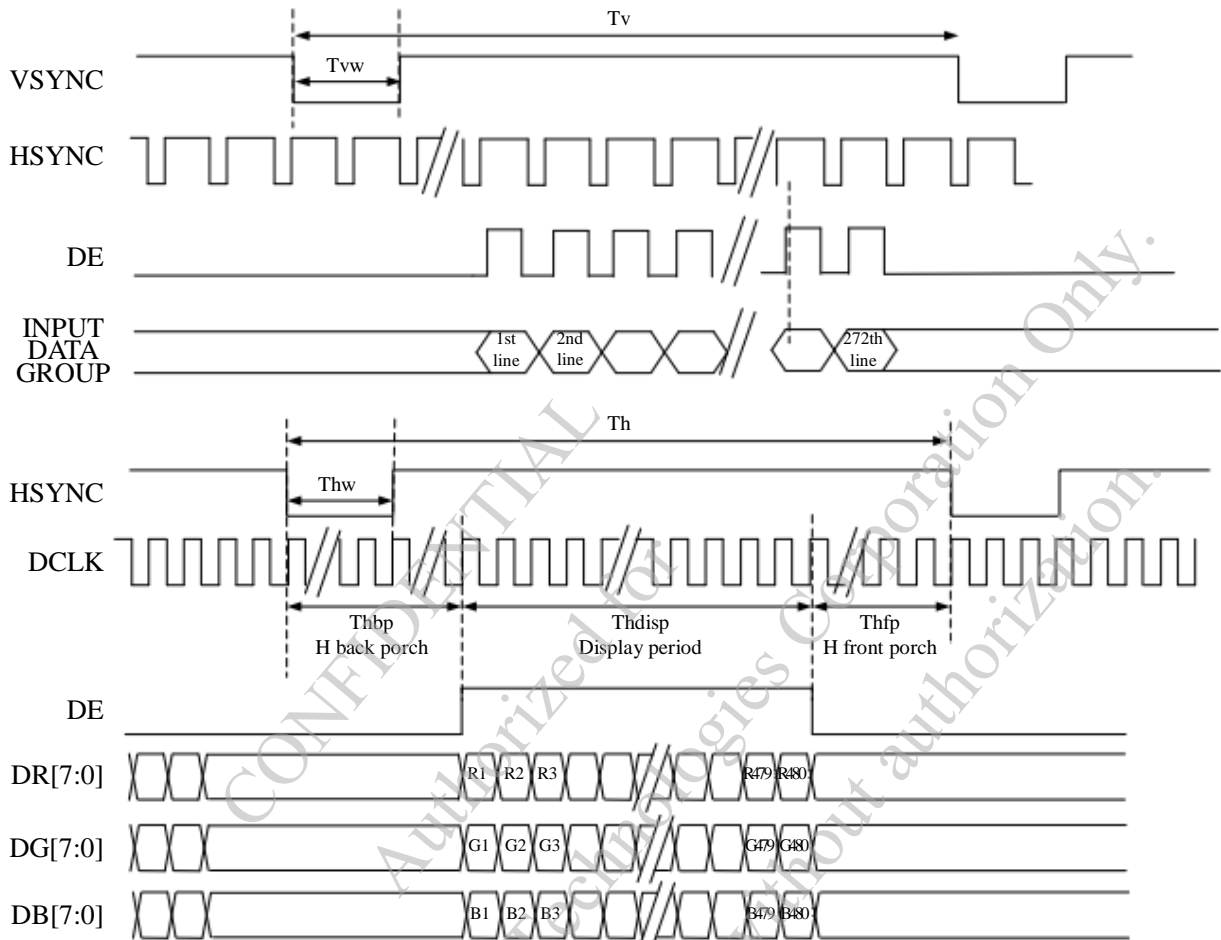


5.1.3 SYNC MODE TIMING DIAGRAM



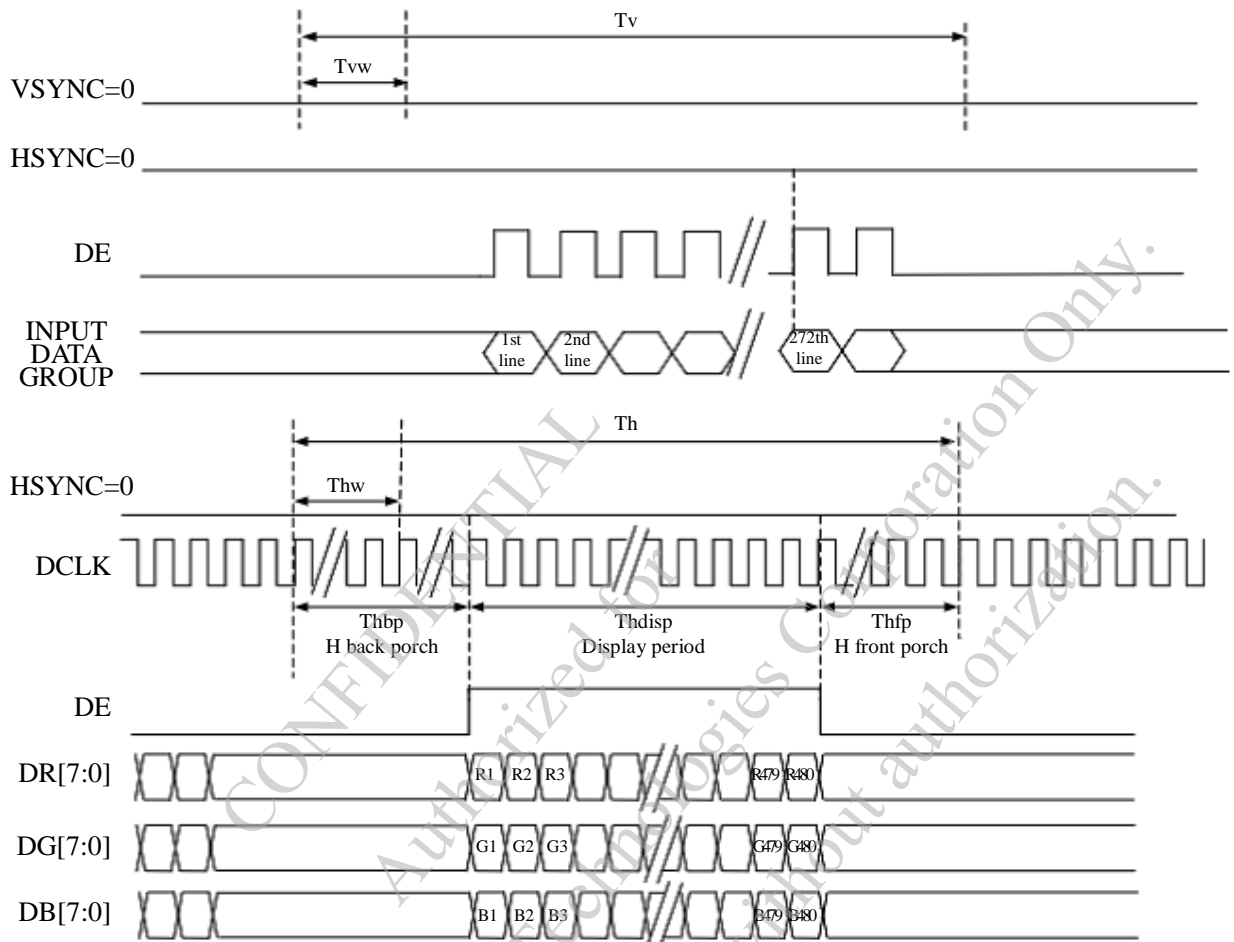
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5.1.4 SYNC-DE MODE TIMING DIAGRAM



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5.1.5 DE MODE TIMING DIAGRAM

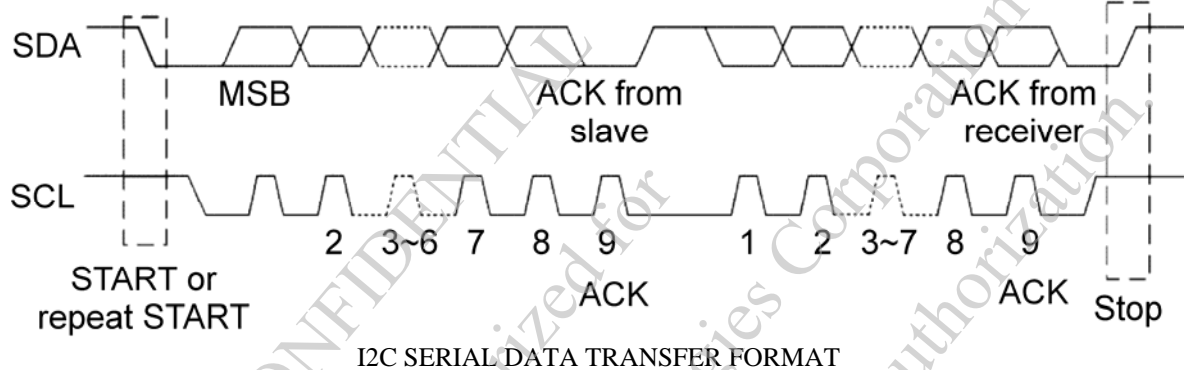


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5.2 FOR CTP MODULE

5.2.1 I2C INTERFACE TIMING CHARACTERISTICS

ITEM	MIN.	TYP.	MAX.	UNIT
SCL FREQUENCY	—	—	400	KHz
BUS FREE TIME BETWEEN A STOP AND START CONDITION	1.3	—	—	us
HOLD TIME (REPEATED) START CONDITION	0.6	—	—	us
DATA SETUP TIME	100	—	—	ns
SETUP TIME FOR A REPEATED START CONDITION	0.6	—	—	us
SETUP TIME FOR STOP CONDITION	0.6	—	—	us

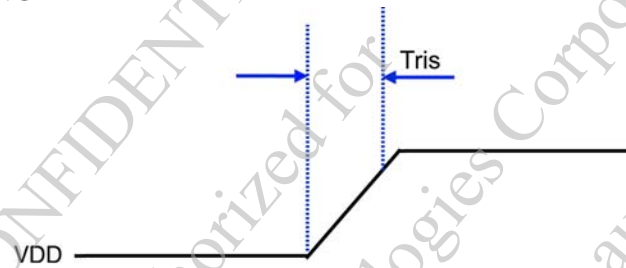


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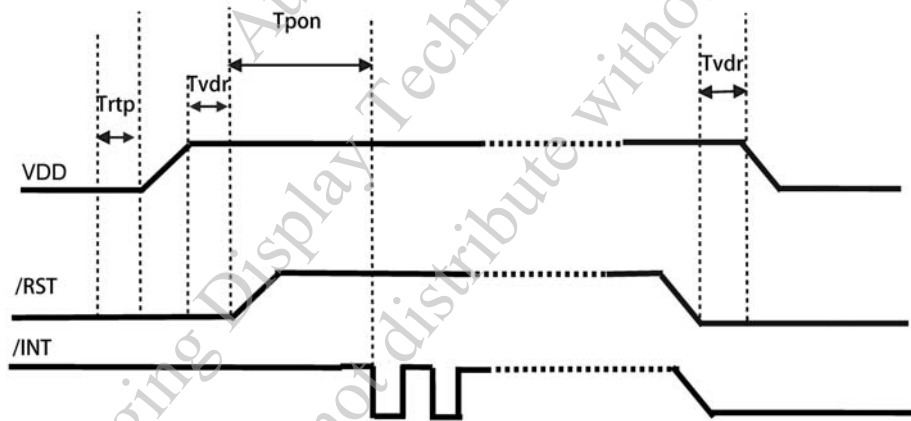
5.2.2 POWER SEQUENCE

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
RISE TIME FROM 0.1VDD TO 0.9VDD	Tris	—	—	5	ms
TIME OF RESETTING TO BE LOW BEFORE POWERING ON	Trtp	100	—	—	us
TIME OF STARTING TO REPORT POINT AFTER POWERING ON	Tpon	200	—	—	ms
RESET TIME AFTER VDD POWERING ON	Tvdr	1	—	—	ms
TIME OF STARTING TO REPORT POINT AFTER RESETTING	Trsi	200	—	—	ms
RESET TIME	Trst	2	—	—	ms

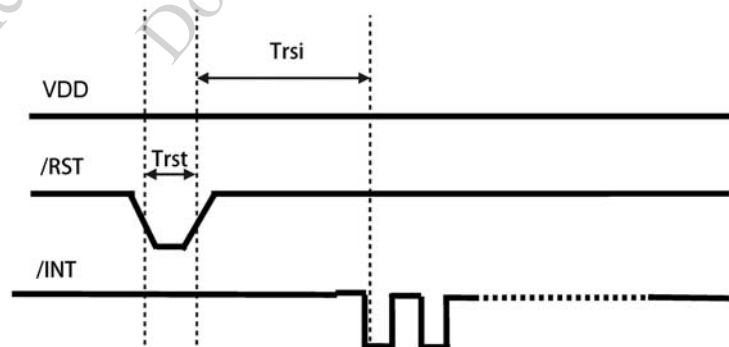
POWER RISE TIMING



POWER ON / OFF TIMING



RESET SEQUENCE



6. OPTICAL CHARACTERISTICS

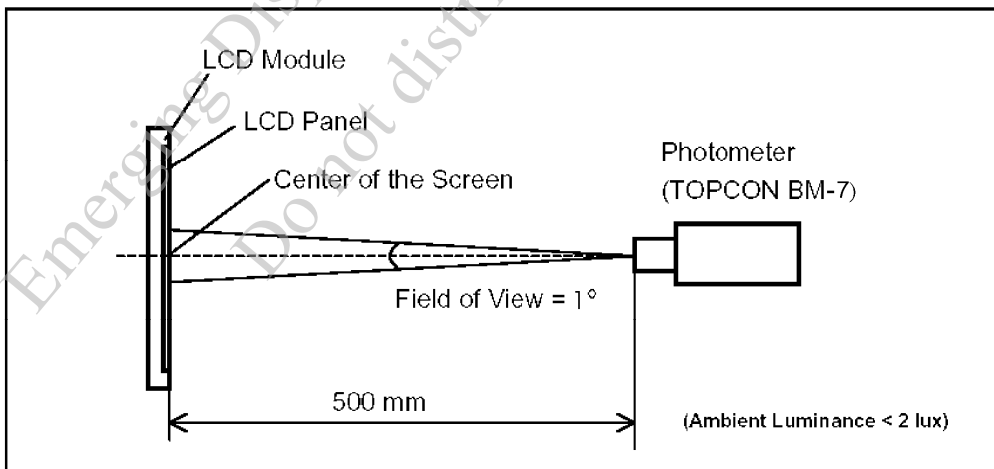
6.1 OPTICAL CHARACTERISTICS

Ta = 25°C

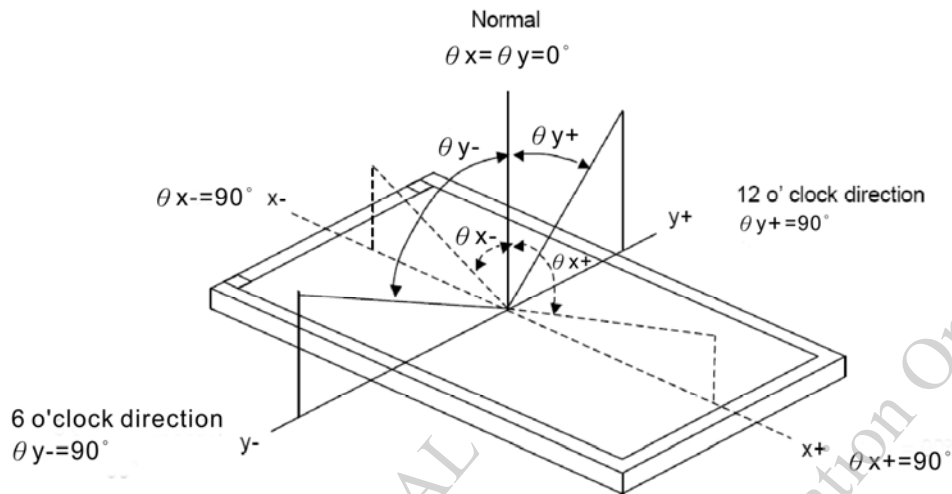
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK	
VIEWING ANGLE	$\theta_{y+}$	CR ≥ 10	$\theta_x=0^\circ$	(50)	(60)	—	deg.	NOTE ( 2 ) NOTE ( 3 )
	$\theta_{y-}$			(60)	(70)	—		
	$\theta_{x+}$		$\theta_y=0^\circ$	(60)	(70)	—		
	$\theta_{x-}$			(60)	(70)	—		
CONTRAST RATIO	CR	$\theta_x=0^\circ, \theta_y=0^\circ$	400	600	—	—	NOTE ( 3 )	
RESPONSE TIME	tr ( rise ) + tf ( fall )	$\theta_x=0^\circ, \theta_y=0^\circ$	—	25	40	msec	NOTE ( 4 )	
THE BRIGHTNESS OF MODULE	B	$\theta_x=0^\circ, \theta_y=0^\circ$ IF = 40mA	(380)	(425)	—	cd/m <sup>2</sup>	NOTE ( 5 )	
COLOR OF CIE COORDINATE	WHITE	Wx	$\theta_x=0^\circ, \theta_y=0^\circ$ VCC-VSS=3.3V IF = 40mA (NTSC : 50%)	(0.250)	(0.300)	(0.350)	—	NOTE ( 6 )
		Wy		(0.270)	(0.320)	(0.370)		
	RED	Rx		(0.535)	(0.586)	(0.635)		
		Ry		(0.314)	(0.364)	(0.414)		
	GREEN	Gx		(0.283)	(0.333)	(0.383)		
		Gy		(0.508)	(0.558)	(0.608)		
	BLUE	Bx		(0.100)	(0.150)	(0.200)		
		By		(0.010)	(0.060)	(0.110)		
THE BRIGHTNESS OF UNIFORMITY	—		70	75	—	%	NOTE ( 5 )	

NOTE ( 1 ) : TEST EQUIPMENT SETUP :

AFTER STABILIZING AND LEAVING THE PANEL ALONE AT A GIVEN TEMPERATURE FOR 30 MINUTES. MEASUREMENT SHOULD BE EXECUTED IN A STABLE, WINDLESS, AND DARK ROOM. OPTICAL SPECIFICATIONS ARE MEASURED BY TOPCON BM-7 (FAST) WITH A VIEWING ANGLE OF 1° AT A DISTANCE OF 50cm AND NORMAL DIRECTION.



NOTE ( 2 ) : DEFINITION OF VIEWING ANGLE :

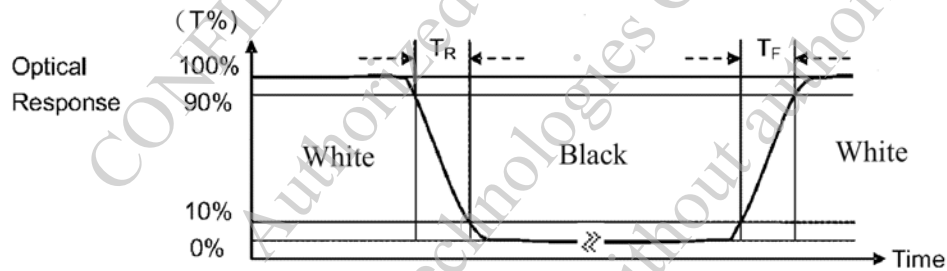


NOTE ( 3 ) : DEFINITION OF CONTRAST RATIO :

$$\text{CONTRAST RATIO (CR)} = \frac{\text{BRIGHTNESS MEASURED WHEN LCD IS AT "WHITE STATE"}}{\text{BRIGHTNESS MEASURED WHEN LCD IS AT "BLACK STATE"}}$$

NOTE ( 4 ) : DEFINITION OF RESPONSE TIME : TR AND TF

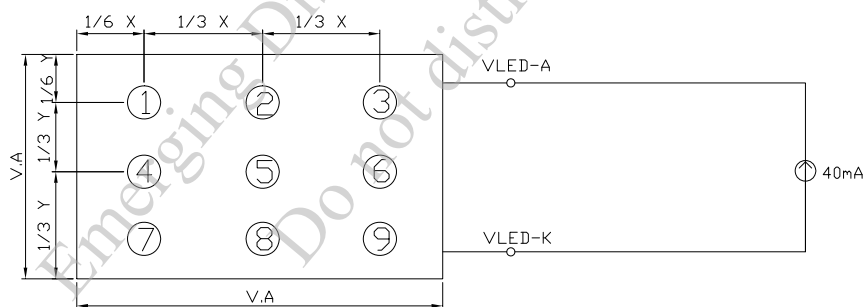
THE FIGURE BELOW IS THE OUTPUT SIGNAL OF THE PHOTO DETECTOR.



NOTE ( 5 ) : MEASURED AT THE CENTER AREA OF THE PANEL WHEN ALL THE INPUT TERMINALS OF LCD PANEL ARE ELECTRICALLY OPENED.

NOTE ( 6 ) : THE 100% TRANSMISSION IS DEFINED AS THE TRANSMISSION OF LCD PANEL WHEN ALL THE INPUT TERMINALS OF MODULE ARE ELECTRICALLY OPENED.

## 6.2 THE BRIGHTNESS TEST METHOD



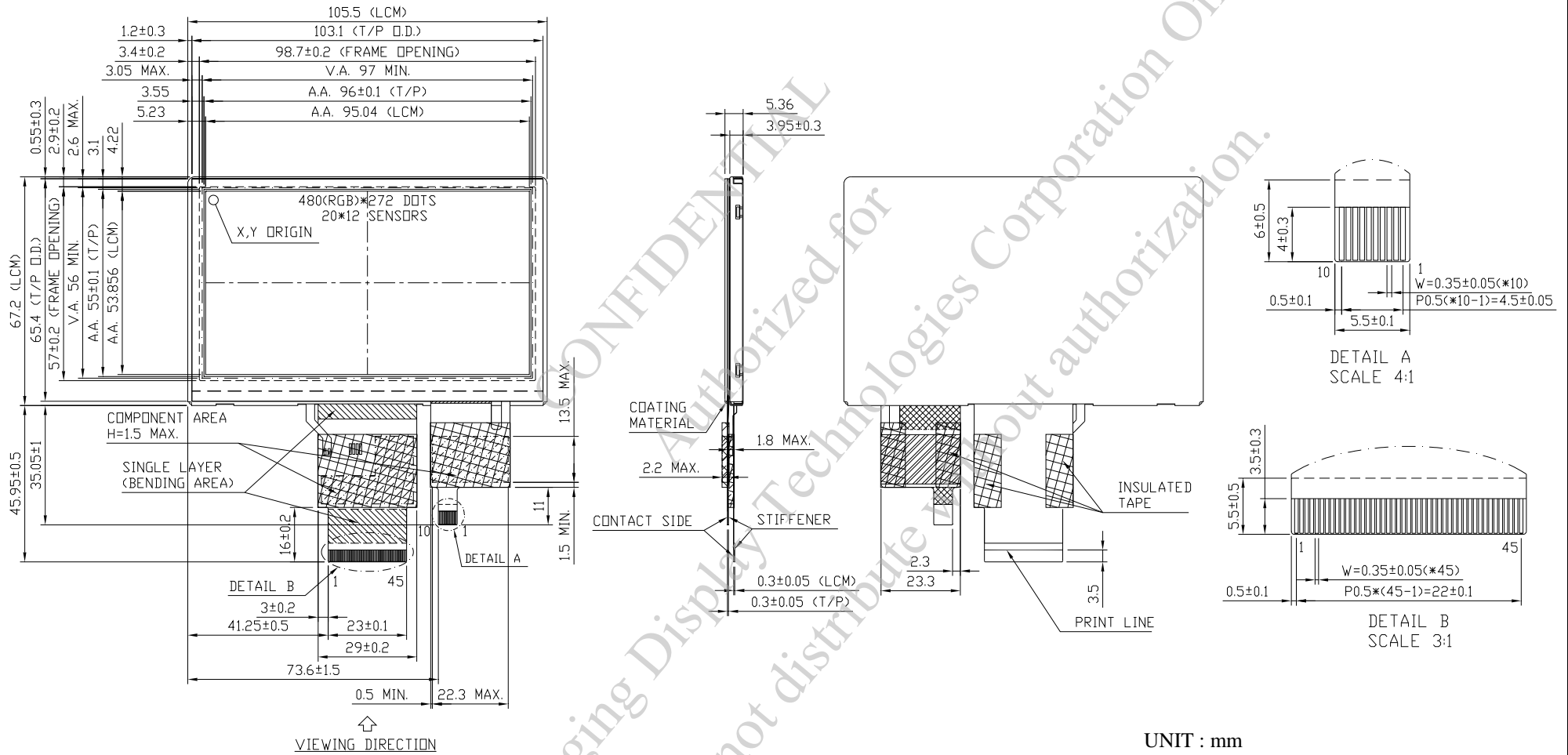
UNIT : mm

## 6.3 THE BRIGHTNESS UNIFORMITY CALCULATE METHOD

$$\text{UNIFORMITY} : \left[ 1 - \frac{\text{MAXIMUM BRIGHTNESS} - \text{MINIMUM BRIGHTNESS}}{\text{AVERAGE BRIGHTNESS}} \right] \times 100\%$$

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7. OUTLINE DIMENSIONS

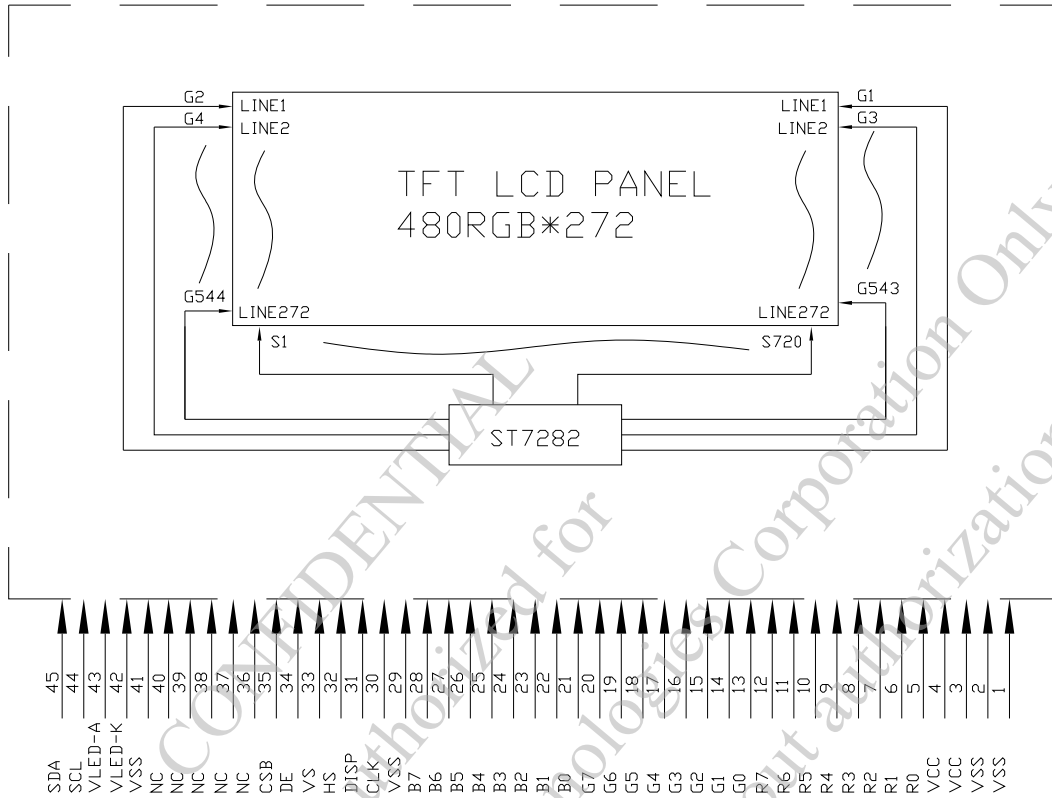


UNIT : mm  
SCALE : NTS  
NOT SPECIFIED TOLERANCE IS ±0.5mm

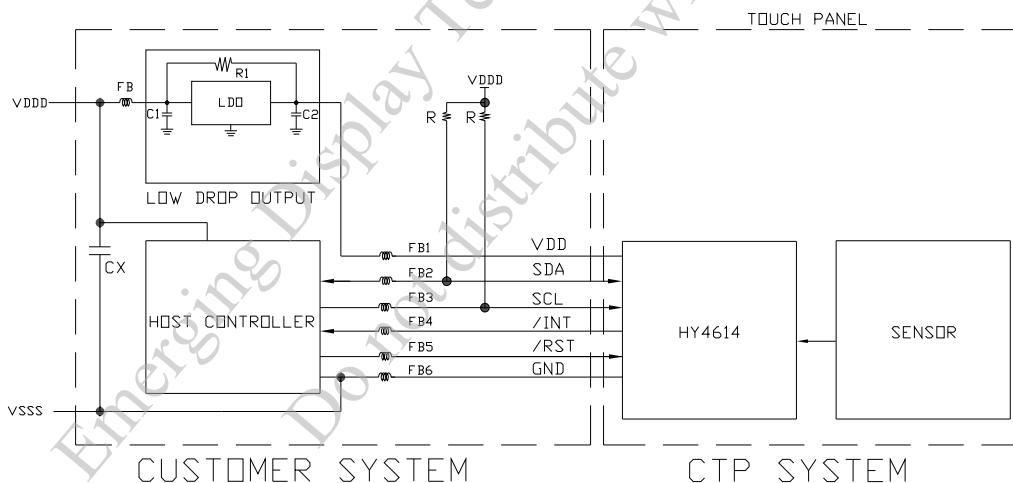


## 8. BLOCK DIAGRAM

### 8.1 TFT



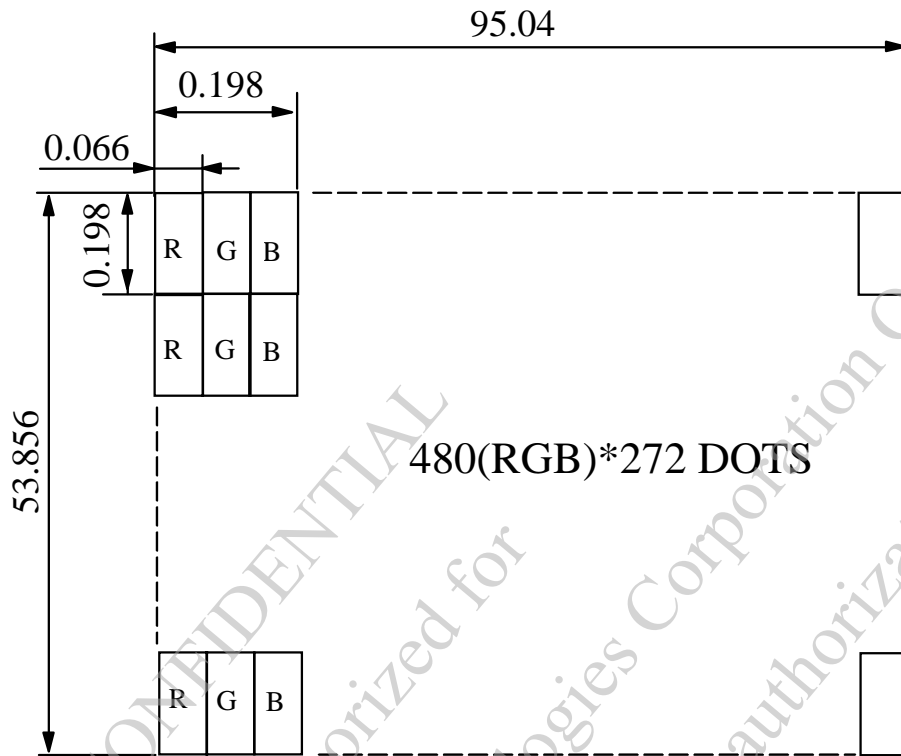
### 8.2 CTP



NOTE ( 1 ) : THE STANDARD IIC COMMUNICATION INTERFACE, SUPREME SCL CLOCK IS 400 KHZ, SLAVE ADDRESS CAN BE SET UP, SUPPORTS VDD LEVEL POWER, NEEDS PULL HIGH RESISTANCE AND WE RECOMMEND THE PULL HIGH RESISTANCE IS 2.0K OHM.

NOTE ( 2 ) : POWER SUPPLY SHALL BE CLEAN AND NOISE FREE. ADDITIONAL FILTERING OR A SEPARATE LDO (LOW DROP OUT) REGULATOR CAN BE REQUIRED. C1 AND C2 CAPACITORS RECOMMENDATION : 4.7 $\mu$ F OR 10  $\mu$ F

9. DETAIL DRAWING OF DOT MATRIX



UNIT : mm  
SCALE : NTS  
NOT SPECIFIED TOLERANCE IS  $\pm 0.1$   
DOTS MATRIX TOLERANCE IS  $\pm 0.01$

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## 10. INTERFACE SIGNALS

### 10.1 LCD MODULE

PIN NO.	SYMBOL	FUNCTION
1	VSS	GROUND
2	VSS	GROUND
3	VCC	+3.3V POWER SOURCE
4	VCC	+3.3V POWER SOURCE
5	R0	RED DATA SIGNAL (LSB)
6	R1	RED DATA SIGNAL
7	R2	RED DATA SIGNAL
8	R3	RED DATA SIGNAL
9	R4	RED DATA SIGNAL
10	R5	RED DATA SIGNAL
11	R6	RED DATA SIGNAL
12	R7	RED DATA SIGNAL (MSB)
13	G0	GREEN DATA SIGNAL (LSB)
14	G1	GREEN DATA SIGNAL
15	G2	GREEN DATA SIGNAL
16	G3	GREEN DATA SIGNAL
17	G4	GREEN DATA SIGNAL
18	G5	GREEN DATA SIGNAL
19	G6	GREEN DATA SIGNAL
20	G7	GREEN DATA SIGNAL (MSB)
21	B0	BLUE DATA SIGNAL (LSB)
22	B1	BLUE DATA SIGNAL
23	B2	BLUE DATA SIGNAL
24	B3	BLUE DATA SIGNAL
25	B4	BLUE DATA SIGNAL
26	B5	BLUE DATA SIGNAL
27	B6	BLUE DATA SIGNAL
28	B7	BLUE DATA SIGNAL (MSB)
29	VSS	GROUND
30	CLK	CLOCK SIGNAL; LATCHING DATA AT THE FALLING EDGE
31	DISP	DISPLAY CONTROL / STANDBY MODE SELECTION. DISP = "LOW" : STANDBY; (DEFAULT) DISP = "HIGH" : NORMAL DISPLAY
32	HS	HORIZONTAL SYNC SIGNAL; NEGATIVE POLARITY

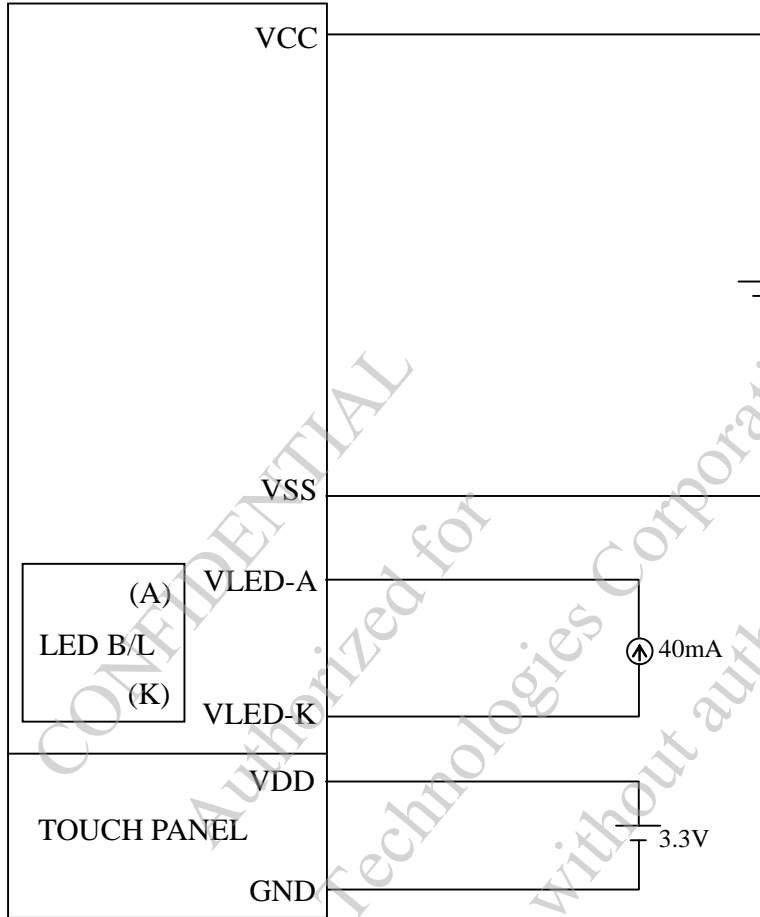
PIN NO.	SYMBOL	FUNCTION
33	VS	VERTICAL SYNC SIGNAL; NEGATIVE POLARITY
34	DE	DATA INPUT ENABLE. ACTIVE HIGH TO ENABLE THE DATA INPUT.
35	CSB	SERIAL COMMUNICATION CHIP SELECT, INTERNAL PULL HIGH
36	NC	NC
37	NC	NC
38	NC	NC
39	NC	NC
40	NC	NC
41	VSS	GROUND
42	VLED-K	LED POWER SOURCE INPUT TERMINAL (CATHODE SIDE)
43	VLED-A	LED POWER SOURCE INPUT TERMINAL (ANODE SIDE)
44	SCL	SERIAL COMMUNICATION CLOCK INPUT, INTERNAL PULL LOW
45	SDA	SERIAL COMMUNICATION DATA INPUT AND OUTPUT, INTERNAL PULL LOW

## 10.2 CTP MODULE

PIN NO.	SYMBOL	FUNCTION
1	GND	GROUND
2	VDD	POWER SUPPLY VOLTAGE
3	SCL	I2C CLOCK INPUT
4	NC	NON CONNECTION
5	SDA	I2C DATA INPUT AND OUTPUT
6	NC	NON CONNECTION
7	/RST	EXTERNAL RESET, LOW IS ACTIVE
8	NC	NON CONNECTION
9	/INT	EXTERNAL INTERRUPT TO THE HOST
10	GND	GROUND

11. POWER SUPPLY

11.1 POWER SUPPLY FOR LCM



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## 12. CAPACITIVE TOUCH PANEL SPECIFICATION

### 12.1 OPTICAL CHARACTERISTICS

ITEM	CONDITION	MIN.	TYP.	MAX.	UNIT
TRANSPARENCY NOTE ( 1 )	Ta = 25°C	85	—	—	%

NOTE ( 1 ) : OPTICAL MEASUREMENT SHOULD BE EXECUTED AFTER PANEL IS SECURED.  
MEASUREMENT PROCESS SHOULD BE EXECUTED IN A STABLE, WINDLESS, AND DARK ROOM. OPTICAL SPECIFICATIONS SHOULD BE MEASURED BY SPECTROPHOTOMETER.

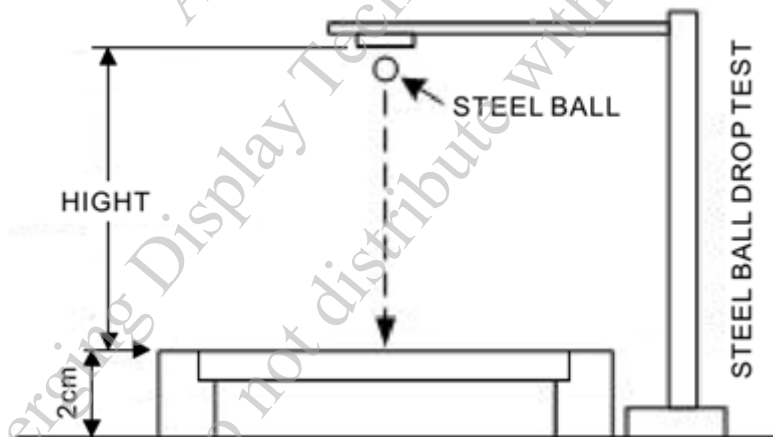
### 12.2 HARDNESS

ITEM	DESCRIPTION
SURFACE HARDNESS	7H (MIN.)

### 12.3 DURABILITY

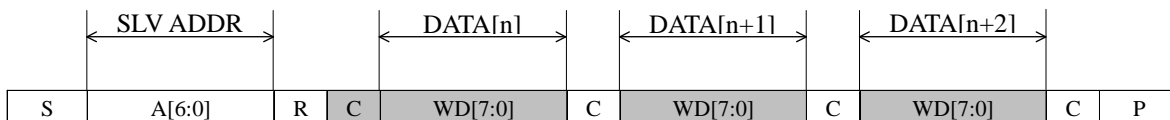
USING STEEL BALL AND FALLING ON TOUCH PANEL SURFACE, FROM THE HEIGHT MUST PASS BELOW CONDITIONS :

ITEM	CONDITION	INSPECTION METHOD	DESCRIPTION
STEEL BALL DROP TEST	WEIGHT : 67g HEIGHT OF FALL : 30 cm	VISUAL INSPECTION	SIGN OF FRACTURE OR DAMAGE IS NOT ACCEPTABLE 3 TIMES/ 1 POINTS, 25°C(CENTER TEST)



## 12.4 PROTOCOL

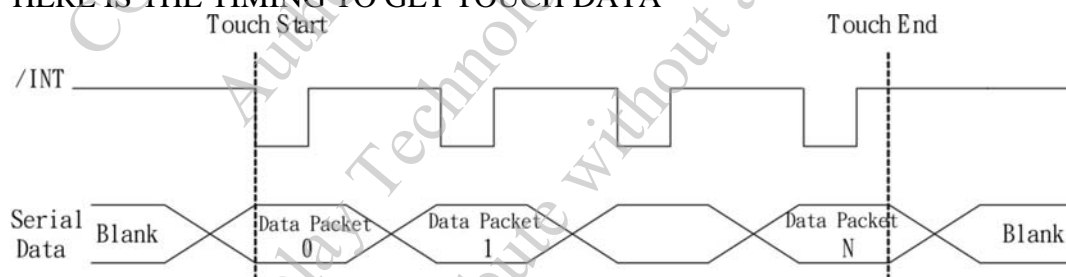
### 12.4.1 I2C READ



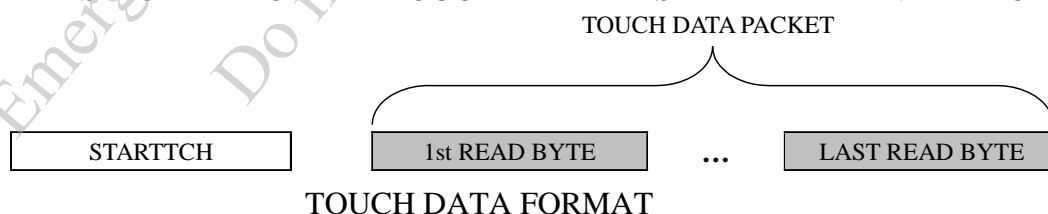
CHARACTER	DESCRIPTION
S	I2C START OR I2C RESTART
A[6:0]	SLAVE ADDRESS, THE VALUE CAN BE CUSTOMIZED
R	OPERATOR BYTE, SHOULD BE 1'b1, STANDS FOR READ
C	ACK SIGNAL
P	STOP SIGNAL (STOP SIGNAL IS OPTIONAL, RESTART SIGNAL IS ALSO OK FOR NEXT PACKET)

SLAVE ADDRESS=0x38

12.4.2 INTERRUPT SIGNAL FOR CTPM TO HOST  
AS FOR STANDARD CTPM, HOST NEED TO USE BOTH INTERRUPT CONTROL SIGNAL AND SERIAL DATA INTERFACE TO GET THE TOUCH DATA.  
HERE IS THE TIMING TO GET TOUCH DATA



12.4.3 READ TOUCH DATA PACKET  
WE DEFINED A CTPM PERIOD AS EACH CAPACITANCE DATA GATHERING AND DATA PROCESS, IN EACH CTPM, IF THERE IS A TOUCH DETECTS, THERE WILL WE A FAME OF TOUCH DATA. HOST CAN GET THE SPECIFIED FORMAT TOUCH DATA BY SERIAL DATA INTERFACE.



TOUCH DATA READ PROTOCOL

IN THIS MODE THE CTP IS FULLY FUNCTIONAL AS A TOUCH SCREEN CONTROLLER. READ AND WRITE ACCESS ADDRESS IS JUST LOGICAL ADDRESS WHICH IS NOT ENFORCED BY HARDWARE OR FIRMWARE. HERE IS THE OPERATING MODE REGISTER MAP.

ADDRESS	NAME	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0	HOST ACCESS
02h	TD_STATUS					NUMBER OF TOUCH POINTS[3:0]				R
03h	TOUCH1_XH	1 <sup>st</sup> EVENT FLAG				1 <sup>st</sup> TOUCH X POSITION[11:8]				R
04h	TOUCH1_XL	1 <sup>st</sup> TOUCH X POSITION[7:0]								R
05h	TOUCH1_YH	1 <sup>st</sup> TOUCH ID[3:0]						1 <sup>st</sup> TOUCH Y POSITION[11:8]		R
06h	TOUCH1_YL	1 <sup>st</sup> TOUCH Y POSITION[7:0]								R
07h										
08h										
09h	TOUCH2_XH	2 <sup>nd</sup> EVENT FLAG				2 <sup>nd</sup> TOUCH X POSITION[11:8]				R
0Ah	TOUCH2_XL	2 <sup>nd</sup> TOUCH X POSITION[7:0]								R
0Bh	TOUCH2_YH	2 <sup>nd</sup> TOUCH ID[3:0]						2 <sup>nd</sup> TOUCH Y POSITION[11:8]		R
0Ch	TOUCH2_YL	2 <sup>nd</sup> TOUCH Y POSITION[7:0]								R
0Dh										R
0Eh										R
0Fh	TOUCH3_XH	3 <sup>rd</sup> EVENT FLAG				3 <sup>rd</sup> TOUCH X POSITION[11:8]				R
10h	TOUCH3_XL	3 <sup>rd</sup> TOUCH X POSITION[7:0]								R
11h	TOUCH3_YH	3 <sup>rd</sup> TOUCH ID[3:0]						3 <sup>rd</sup> TOUCH Y POSITION[11:8]		R
12h	TOUCH3_YL	3 <sup>rd</sup> TOUCH Y POSITION[7:0]								R
13h										R
14h										R
15h	TOUCH4_XH	4 <sup>th</sup> EVENT FLAG				4 <sup>th</sup> TOUCH X POSITION[11:8]				R
16h	TOUCH4_XL	4 <sup>th</sup> TOUCH X POSITION[7:0]								R
17h	TOUCH4_YH	4 <sup>th</sup> TOUCH ID[3:0]						4 <sup>th</sup> TOUCH Y POSITION[11:8]		R
18h	TOUCH4_YL	4 <sup>th</sup> TOUCH Y POSITION[7:0]								R
19h										R
1Ah										R
1Bh	TOUCH5_XH	5 <sup>th</sup> EVENT FLAG				5 <sup>th</sup> TOUCH X POSITION[11:8]				R
1Ch	TOUCH5_XL	5 <sup>th</sup> TOUCH X POSITION[7:0]								R
1Dh	TOUCH5_YH	5 <sup>th</sup> TOUCH ID[3:0]						5 <sup>th</sup> TOUCH Y POSITION[11:8]		R
1Eh	TOUCH5_YL	5 <sup>th</sup> TOUCH Y POSITION[7:0]								R
1Fh										R
20h										R
A6h	ID_G_FIRMID	FIRMWARE ID								R



TD\_STATUS

THIS REGISTER IS THE TOUCH DATA STATUS REGISTER.

ADDRESS	BIT ADDRESS	REGISTER NAME	DESCRIPTION
02h	3:0	NUMBER OF TOUCH POINTS [3:0]	HOW MANY POINTS DETECTED. 1-5 IS VALID.
	7:4	NONE	NONE

TOUCHn\_XH (n:1-5)

THIS REGISTER DESCRIBES MSB OF THE X COORDINATE OF THE NTH TOUCH POINT AND THE CORRESPONDING EVENT FLAG.

ADDRESS	BIT ADDRESS	REGISTER NAME	DESCRIPTION
03h ~ 1Bh	7:6	EVENT FLAG	00b: PUT DOWN 01b: PUT UP 10b: CONTACT 11b: RESERVED
	5:4	NONE	RESERVED
	3:0	TOUCH X POSITION [11:8]	MSB OF TOUCH X POSITION IN PIXELS

TOUCHn\_XL (n:1-5)

THIS REGISTER DESCRIBES LSB OF THE X COORDINATE OF THE NTH TOUCH POINT.

ADDRESS	BIT ADDRESS	REGISTER NAME	DESCRIPTION
04h ~ 1Ch	7:0	TOUCH X POSITION [7:0]	LSB OF THE TOUCH X POSITION IN PIXELS

TOUCHn\_YH (n:1-5)

THIS REGISTER DESCRIBES MSB OF THE Y COORDINATE OF THE NTH TOUCH POINT AND CORRESPONDING TOUCH ID.

ADDRESS	BIT ADDRESS	REGISTER NAME	DESCRIPTION
05h ~ 1Dh	7:4	TOUCH ID [3:0]	TOUCH ID OF TOUCH POINT
	3:0	TOUCH X POSITION [11:8]	MSB OF TOUCH Y POSITION IN PIXELS

TOUCHn\_YL (n:1-5)

THIS REGISTER DESCRIBES LSB OF THE Y COORDINATE OF THE NTH TOUCH POINT.

ADDRESS	BIT ADDRESS	REGISTER NAME	DESCRIPTION
06h ~ 1Eh	7:0	TOUCH X POSITION [7:0]	LSB OF THE TOUCH Y POSITION IN PIXELS

ID\_G\_FIRMWARE\_ID

THIS REGISTER DESCRIBES THE FIRMWARE ID OF THE APPLICATION

ADDRESS	BIT ADDRESS	REGISTER NAME	DESCRIPTION
A6h	7:0	ID_G_FIRMWARE_ID	FIRMWARE VERSION

13. INSPECTION CRITERION

13.1 APPLICATION

THIS INSPECTION STANDARD IS TO BE APPLIED TO THE LCD MODULE DELIVERED FROM EMERGING DISPLAY TECHNOLOGIES CORP.( E.D.T ) TO CUSTOMERS

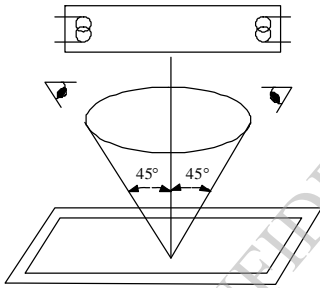
13.2 INSPECTION CONDITIONS

13.2.1 (1)OBSERVATION DISTANCE : 45±5cm

(2)VIEW ANGLE : ±45°

PERPENDICULAR TO MODULE SURFACE

VIEWING ANGLE SHOULD BE SMALLER THAN 45°



LINE OF SIGHT FOR INSPECTION SHALL BE WITHIN THE HALF SECTION OF THE VIEWING CONE GENERATED BY LINE SEGMENT 45° WITH RESPECTS TO THE VERTICAL AXIS FROM CENTER VERTEX OF LCD, THE CONE AXIS MUST BE PERPENDICULAR NORMAL TO LCD SURFACE AND PASSES THROUGH THE FLUORESCENT LAMP.

13.2.2 ENVIRONMENT CONDITIONS :

AMBIENT TEMPERATURE		25±5°C
AMBIENT HUMIDITY		65 ± 20%RH
AMBIENT ILLUMINATION	COSMETIC INSPECTION	600~800 lux
	FUNCTIONAL INSPECTION	300~500 lux
INSPECTION TIME		10 secs

13.2.3 INSPECTION LOT

QUANTITY PER DELIVERY LOT FOR EACH MODEL

13.2.4 A SAMPLING INSPECTION SHALL BE MADE ACCORDING TO THE FOLLOWING PROVISIONS TO JUDGE THE ACCEPTABILITY

(a)APPLICABLE STANDARD :

MIL-STD-105E LEVEL II

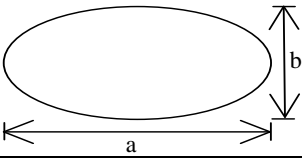
NORMAL INSPECTION, SINGLE SAMPLING

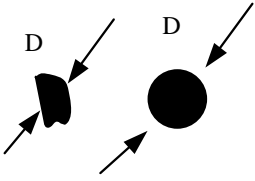
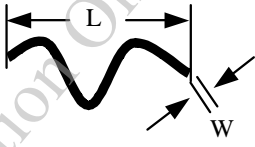
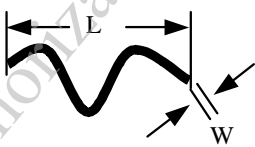
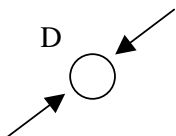
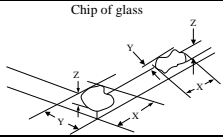
(b)AQL : MAJOR DEFECT : AQL 0.65

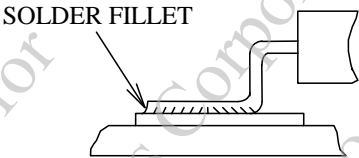
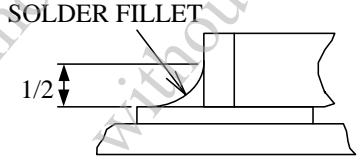
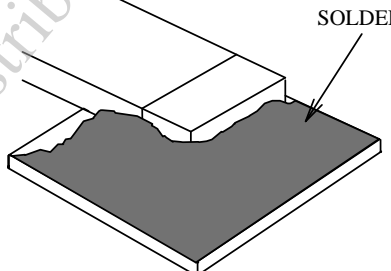
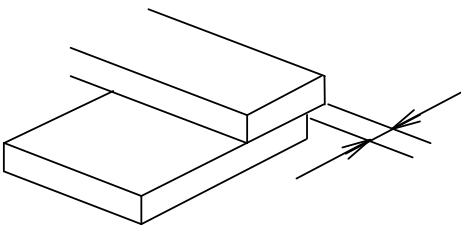
MINOR DEFECT : AQL 1.0

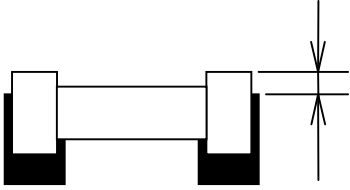
13.3 DEFECTS CLASSIFICATION

TYPE OF DEFECT	INSPECTION ITEM	DEFECT FEATURE	AQL
MAJOR DEFECT	1.DISPLAY ON	<ul style="list-style-type: none"> <li>• DEFECT TO MISS SPECIFIED DISPLAY FUNCTION, FOR ALL AND SPECIFIED DOTS</li> <li>EX: DISCONNECTION, SHORT CIRCUIT ETC</li> </ul>	0.65
	2.CTP FUNCTION	<ul style="list-style-type: none"> <li>• NO FUNCTION</li> <li>• BROKEN LINE</li> <li>• FALSE TOUCH</li> </ul>	
	3.BACKLIGHT	<ul style="list-style-type: none"> <li>• NO LIGHT</li> <li>• FLICKERING AND OTHER ABNORMAL ILLUMINATION</li> </ul>	
	4.DIMENSIONS	<ul style="list-style-type: none"> <li>• SUBJECT TO INDIVIDUAL ACCEPTANCE SPECIFICATIONS</li> </ul>	
MINOR DEFECT	1.DISPLAY ZONE (VIEWING AREA)	<ul style="list-style-type: none"> <li>• BLACK/WHITE SPOT / CIRCULAR TYPE</li> <li>• BUBBLES ON POLARIZER</li> <li>• NEWTON RING</li> <li>• BLACK/WHITE LINE / LINEAR TYPE</li> <li>• SCRATCH</li> <li>• CONTAMINATION</li> <li>• UNEVEN COLOR SPREAD</li> </ul>	1.0
	2.BEZEL ZONE	<ul style="list-style-type: none"> <li>• STAINS</li> <li>• SCRATCHES</li> <li>• FOREIGN MATTER</li> </ul>	
	3.SOLDERING	<ul style="list-style-type: none"> <li>• INSUFFICIENT SOLDER</li> <li>• SOLDERED IN INCORRECT POSITION</li> <li>• CONVEX SOLDERING SPOT</li> <li>• SOLDER BALLS</li> <li>• SOLDER SCRAPS</li> </ul>	
	4.DISPLAY ON (ALL ON)	<ul style="list-style-type: none"> <li>• LIGHT LINE</li> </ul>	

NO.	ITEM	CRITERIA																				
1	DISPLAY ON INSPECTION	1. INCORRECT PATTERN 2. MISSING SEGMENT 3. DIM SEGMENT 4. OPERATING VOLTAGE BEYOND SPEC																				
2	OVERALL DIMENSIONS	1. OVERALL DIMENSION BEYOND SPEC																				
3	DOT DEFECT	<p>1. INSPECTION PATTERN: FULL WHITE, FULL BLACK, RED, GREEN AND BLUE SCREENS.</p> <p>2.</p> <table border="1"> <thead> <tr> <th>ITEMS</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>BRIGHT DOT</td> <td><math>N \leq 2</math></td> </tr> <tr> <td>DARK DOT</td> <td><math>N \leq 3</math></td> </tr> <tr> <td>TOTAL BRIGHT AND DARK DOTS</td> <td><math>N \leq 4</math></td> </tr> </tbody> </table> <p>NOTE :</p> <p>(1)THE DEFINITION OF DOT : THE SIZE OF A DEFECTIVE DOT OVER 1/2 OF WHOLE DOT IS REGARDED AS ONE DEFECTIVE DOT.</p> <p>(2)BRIGHT DOT : DOTS APPEAR BRIGHT AND UNCHANGED IN SIZE IN WHICH LCD PANEL IS DISPLAYING UNDER BLACK PATTERN. THE BRIGHT DOT DEFECT MUST BE VISIBLE THROUGH 6% ND FILTER.</p> <p>(3)DARK DOT : DOTS APPEAR DARK AND UNCHANGED IN SIZE IN WHICH LCD PANEL IS DISPLAYING UNDER PURE RED, GREEN, BLUE PICTURE.</p>	ITEMS	PERMISSIBLE NO.	BRIGHT DOT	$N \leq 2$	DARK DOT	$N \leq 3$	TOTAL BRIGHT AND DARK DOTS	$N \leq 4$												
ITEMS	PERMISSIBLE NO.																					
BRIGHT DOT	$N \leq 2$																					
DARK DOT	$N \leq 3$																					
TOTAL BRIGHT AND DARK DOTS	$N \leq 4$																					
4	BUBBLES ON POLARIZER /SURFACE STAINS /DIRT/CF FAIL/SPOT	<table border="1"> <thead> <tr> <th></th> <th>AVERAGE DIAMETER (mm) : D</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td rowspan="3">BUBBLE ON POLARIZER</td> <td><math>D \leq 0.25</math></td> <td>IGNORE</td> </tr> <tr> <td><math>0.25 &lt; D \leq 0.5</math></td> <td><math>N \leq 5</math></td> </tr> <tr> <td><math>0.5 &lt; D</math></td> <td>0</td> </tr> <tr> <td rowspan="2">SURFACE STAINS / DIRT ON POLARIZER</td> <td><math>D &lt; 0.1</math></td> <td>IGNORE</td> </tr> <tr> <td><math>0.1 &lt; D \leq 0.3</math></td> <td><math>N \leq 3</math></td> </tr> <tr> <td rowspan="2">CF FAIL / SPOT</td> <td><math>D &lt; 0.1</math></td> <td>IGNORE</td> </tr> <tr> <td><math>0.1 &lt; D \leq 0.3</math></td> <td><math>N \leq 3</math></td> </tr> </tbody> </table> <p>NOTE : (1)POLARIZER BUBBLE IS DEFINED AS THE BUBBLE APPEARS ON ACTIVE DISPLAY AREA. THE DEFECT OF POLARIZER BUBBLE SHALL BE IGNORED IF THE POLARIZER BUBBLE APPEARS ON THE OUTSIDE OF ACTIVE DISPLAY AREA.</p> <p>(2)THE EXTRANEIOUS SUBSTANCE IS DEFINED AS IT CAN BE OBSERVED WHEN THE MODULE IS POWER ON.</p> <p>(3)THE DEFINITION OF AVERAGE DIAMETER, D IS DEFINED AS FOLLOWING. AVERAGE DIAMETER (D)=(a+b)/2</p> 		AVERAGE DIAMETER (mm) : D	PERMISSIBLE NO.	BUBBLE ON POLARIZER	$D \leq 0.25$	IGNORE	$0.25 < D \leq 0.5$	$N \leq 5$	$0.5 < D$	0	SURFACE STAINS / DIRT ON POLARIZER	$D < 0.1$	IGNORE	$0.1 < D \leq 0.3$	$N \leq 3$	CF FAIL / SPOT	$D < 0.1$	IGNORE	$0.1 < D \leq 0.3$	$N \leq 3$
	AVERAGE DIAMETER (mm) : D	PERMISSIBLE NO.																				
BUBBLE ON POLARIZER	$D \leq 0.25$	IGNORE																				
	$0.25 < D \leq 0.5$	$N \leq 5$																				
	$0.5 < D$	0																				
SURFACE STAINS / DIRT ON POLARIZER	$D < 0.1$	IGNORE																				
	$0.1 < D \leq 0.3$	$N \leq 3$																				
CF FAIL / SPOT	$D < 0.1$	IGNORE																				
	$0.1 < D \leq 0.3$	$N \leq 3$																				

NO.	ITEM	CRITERIA												
5	BLACK/WHITE SPOT CIRCULAR TYPE	<p>THE FOLLOWING BLACK/WHITE SPOT ARE WITHIN THE VIEWING AREA. AVERAGE DIAMETER : D (mm)</p> <table border="1"> <thead> <tr> <th>SIZE D</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>D≤0.15</td> <td>IGNORE</td> </tr> <tr> <td>0.15&lt;D≤0.3</td> <td>4</td> </tr> <tr> <td>0.3&lt;D≤0.5</td> <td>1</td> </tr> <tr> <td>D&gt;0.5</td> <td>0</td> </tr> </tbody> </table> <p>NOTE ( 1 ) : THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART.</p>		SIZE D	PERMISSIBLE NO.	D≤0.15	IGNORE	0.15<D≤0.3	4	0.3<D≤0.5	1	D>0.5	0	
SIZE D	PERMISSIBLE NO.													
D≤0.15	IGNORE													
0.15<D≤0.3	4													
0.3<D≤0.5	1													
D>0.5	0													
6	SCRATCH	<p>THE FOLLOWING SCRATCH IS WITHIN THE VIEWING AREA. WIDTH : W (mm) , LENGTH : L (mm)</p> <table border="1"> <thead> <tr> <th>SIZE W &amp; L</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>W≤0.05</td> <td>IGNORE</td> </tr> <tr> <td>0.05&lt;W≤0.08, L≤8</td> <td>3</td> </tr> <tr> <td>0.08&lt;W≤0.1, L≤5</td> <td>3</td> </tr> <tr> <td>W&gt;0.1</td> <td>0</td> </tr> </tbody> </table> <p>NOTE ( 1 ) : THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 5mm APART.</p>		SIZE W & L	PERMISSIBLE NO.	W≤0.05	IGNORE	0.05<W≤0.08, L≤8	3	0.08<W≤0.1, L≤5	3	W>0.1	0	
SIZE W & L	PERMISSIBLE NO.													
W≤0.05	IGNORE													
0.05<W≤0.08, L≤8	3													
0.08<W≤0.1, L≤5	3													
W>0.1	0													
7	BLACK / WHITE LINE LINEAR TYPE / FOREIGN FIBER	<p>THE FOLLOWING BLACK LINE, WHITE LINE IS WITHIN THE VIEWING AREA. WIDTH : W (mm) , LENGTH : L (mm)</p> <table border="1"> <thead> <tr> <th>SIZE W &amp; L</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>W≤0.05</td> <td>IGNORE</td> </tr> <tr> <td>0.05&lt;W≤0.08, L≤8</td> <td>3</td> </tr> <tr> <td>0.08&lt;W≤0.1, L≤5</td> <td>3</td> </tr> <tr> <td>W&gt;0.1</td> <td>0</td> </tr> </tbody> </table> <p>NOTE ( 1 ) : THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 5mm APART.</p>		SIZE W & L	PERMISSIBLE NO.	W≤0.05	IGNORE	0.05<W≤0.08, L≤8	3	0.08<W≤0.1, L≤5	3	W>0.1	0	
SIZE W & L	PERMISSIBLE NO.													
W≤0.05	IGNORE													
0.05<W≤0.08, L≤8	3													
0.08<W≤0.1, L≤5	3													
W>0.1	0													
8	BUBBLE / DENT FOR OPTICAL BONDING	<p>BUBBLES WITHIN VIEWING AREA. AVERAGE DIAMETER : D (mm)</p> <table border="1"> <thead> <tr> <th>SIZE D</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>D≤0.2</td> <td>IGNORE</td> </tr> <tr> <td>0.2&lt;D≤0.3</td> <td>3</td> </tr> <tr> <td>0.3&lt;D≤0.5</td> <td>2</td> </tr> <tr> <td>D&gt;0.5</td> <td>0</td> </tr> </tbody> </table> <p>NOTE ( 1 ) : THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART.</p>		SIZE D	PERMISSIBLE NO.	D≤0.2	IGNORE	0.2<D≤0.3	3	0.3<D≤0.5	2	D>0.5	0	
SIZE D	PERMISSIBLE NO.													
D≤0.2	IGNORE													
0.2<D≤0.3	3													
0.3<D≤0.5	2													
D>0.5	0													
9	CHIPPING	<table border="1"> <tr> <td>CORNER</td> <td><math>X + Y \leq 4\text{mm} \cdot Z \leq t</math> (t : THICKNESS)</td> </tr> <tr> <td>EDGE</td> <td><math>X \leq 6\text{mm} , Y \leq 1\text{mm} , Z &lt; t</math> (t : THICKNESS)</td> </tr> </table>	CORNER	$X + Y \leq 4\text{mm} \cdot Z \leq t$ (t : THICKNESS)	EDGE	$X \leq 6\text{mm} , Y \leq 1\text{mm} , Z < t$ (t : THICKNESS)								
CORNER	$X + Y \leq 4\text{mm} \cdot Z \leq t$ (t : THICKNESS)													
EDGE	$X \leq 6\text{mm} , Y \leq 1\text{mm} , Z < t$ (t : THICKNESS)													
10	CRACKED GLASS	NOT ACCEPTABLE												
11	LINE DEFECT ON DISPLAY	OBVIOUS VERTICAL OR HORIZONTAL LINE DEFECT IS NOT ALLOWED.												
12	MURA ON DISPLAY	IT'S ACCEPTABLE, IF MURA IS SLIGHT VISIBLE THROUGH 6% ND FILTER.												
13	UNEVEN COLOR SPREAD, COLORATION	TO BE DETERMINED BASED UPON THE LIMITED SAMPLE.												
14	BEZEL APPEARANCE	<p>1. BEZEL MAY NOT HAVE RUST, BE DEFORMED OR HAVE FINGER PRINTS STAINS OF OTHER CONTAMINATION.</p> <p>2. BEZEL MUST COMPLY WITH JOB SPECIFICATIONS.</p>												

NO.	ITEM	CRITERIA
15	PCB	<ol style="list-style-type: none"> <li>1. THERE MAY NOT BE MORE THAN 2mm OF SEALANT OUTSIDE THE SEAL AREA ON THE PCB, AND THERE SHOULD BE NO MORE THAN THREE PLACES.</li> <li>2. NO OXIDATION OR CONTAMINATION ON PCB TERMINALS.</li> <li>3. PARTS ON PCB MUST BE THE SAME AS ON THE PRODUCTION CHARACTERISTIC CHART. THERE SHOULD BE NO WRONG PARTS, MISSING PARTS OR EXCESS PARTS.</li> <li>4. THE JUMPER ON THE PCB SHOULD CONFORM TO THE PRODUCT CHARACTERISTIC CHART.</li> <li>5. IF SOLDER GETS ON BEZEL TAB PADS, LED PAD, ZEBRA PAD OR SCREW HOLD PAD; MAKE SURE IT IS SMOOTHED DOWN.</li> </ol>
16	SOLDERING	<ol style="list-style-type: none"> <li>1. NO SOLDERING FOUND ON THE SPECIFIED PLACE</li> <li>2. INSUFFICIENT SOLDER               <ol style="list-style-type: none"> <li>(a)LSI, IC A POOR WETTING OF SOLDER IS BETWEEN LOWER BEND OR "HEEL" OF LEAD AND PAD   </li> <li>(b)CHIP COMPONENT  <ul style="list-style-type: none"> <li>· SOLDER IS LESS THAN 50% OF SIDES AND FRONT FACE WETTING   </li> <li>· SOLDER WETS 3 SIDES OF TERMINAL, BUT LESS THAN 25% OF SIDES AND FRONT SURFACE AREA ARE COVERED   </li> </ul> </li> </ol> </li> <li>3. PARTS ALIGNMENT               <ol style="list-style-type: none"> <li>(a)LSI, IC LEAD WIDTH IS MORE THAN 50% BEYOND PAD OUTLINE   </li> </ol> </li> </ol>

NO.	ITEM	CRITERIA
16	SOLDERING	<p>(b)CHIP COMPONENT COMPONENT IS OFF CENTER, AND MORE THAN 50% OF THE LEADS IS OFF THE PAD OUTLINE</p>  <p>4. NO UNMELTED SOLDER PASTE MAY BE PRESENT ON THE PCB. 5. NO COLD SOLDER JOINTS, MISSING SOLDER CONNECTIONS, OXIDATION OR ICICLE. 6. NO RESIDUE OR SOLDER BALLS ON PCB. 7. NO SHORT CIRCUITS IN COMPONENTS ON PCB.</p>
17	BACKLIGHT	<p>1. NO LIGHT 2. FLICKERING AND OTHER ABNORMAL ILLUMINATION 3. SPOTS OR SCRATCHES THAT APPEAR WHEN LIT MUST BE JUDGED USING LCD SPOT, LINES AND CONTAMINATION STANDARDS. 4. BACKLIGHT DOESN'T LIGHT OR COLOR IS WRONG.</p>
18	GENERAL APPEARANCE	<p>1. NO OXIDATION, CONTAMINATION, CURVES OR, BENDS ON INTERFACE PIN (OLB) OF TCP. 2. NO CRACKS ON INTERFACE PIN (OLB) OF TCP. 3. NO CONTAMINATION, SOLDER RESIDUE OR SOLDER BALLS ON PRODUCT. 4. THE IC ON THE TCP MAY NOT BE DAMAGED, CIRCUITS. 5. THE UPPERMOST EDGE OF THE PROTECTIVE STRIP ON THE INTERFACE PIN MUST BE PRESENT OR LOOK AS IF IT CAUSE THE INTERFACE PIN TO SEVER. 6. THE RESIDUAL ROSIN OR TIN OIL OF SOLDERING (COMPONENT OR CHIP COMPONENT) IS NOT BURNED INTO BROWN OR BLACK COLOR. 7. SEALANT ON TOP OF THE ITO CIRCUIT HAS NOT HARDENED. 8. PIN TYPE MUST MATCH TYPE IN SPECIFICATION SHEET. 9. LCD PIN LOOSE OR MISSING PINS. 10. PRODUCT PACKAGING MUST BE THE SAME AS SPECIFIED ON PACKAGING SPECIFICATION SHEET. 11. PRODUCT DIMENSION AND STRUCTURE MUST CONFORM TO PRODUCT SPECIFICATION SHEET. 12. THE APPEARANCE OF HEAT SEAL SHOULD NOT ADMIT ANY DIRT AND BREAK.</p>

NOTE :

- FOR ANY SPOTS OR LINES, WHICH ARE NOT OBSERVED UNDER APPROPRIATE PANEL OPERATING CONDITION ARE DEEMED ACCEPTABLE.
- THE FOREIGN MATERIALS THAT CAN BE BLOWN OUT BY AIR AND REMOVED BY WET CLEANING ARE NOT REGARDED AS DEFECTS.

14. RELIABILITY TEST

14.1 STANDARD SPECIFICATIONS FOR RELIABILITY OF LCD MODULE

NO.	ITEM	DESCRIPTION
1	HIGH TEMPERATURE OPERATION	THE SAMPLE SHOULD BE ALLOWED TO STAND AT +70°C FOR 240 HRS
2	LOW TEMPERATURE OPERATION	THE SAMPLE SHOULD BE ALLOWED TO STAND AT -20°C FOR 240 HRS
3	HIGH TEMPERATURE STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT +80°C FOR 240 HRS
4	LOW TEMPERATURE STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT -30°C FOR 240 HRS
5	HIGH TEMPERATURE /HUMIDITY TEST STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT 60°C, 90% RH 240 HRS
6	THERMAL SHOCK (NOT OPERATED)	<p>THE SAMPLE SHOULD BE ALLOWED TO STAND THE FOLLOWING 10 CYCLES OF OPERATION:</p> <p>The diagram shows a temperature profile for a thermal shock test cycle. The temperature starts at -30°C, ramps up to +80°C over 30 minutes, stays at +80°C for 3 minutes, ramps down to -30°C over 30 minutes, and stays at -30°C for 3 minutes. The total duration of one cycle is 72 minutes. The cycle is repeated 10 times.</p>
7	ESD (ELECTROSTATIC DISCHARGE) (NOT OPERATED)	AIR DISCHARGE ± 12KV CONTACT DISCHARGE ± 8KV ACCORDING TO IEC-61000-4-2

NOTE ( 1 ) : THE TEST SAMPLES HAVE RECOVERY TIME FOR 2 HOURS AT ROOM TEMPERATURE BEFORE THE FUNCTION CHECK. IN THE STANDARD CONDITIONS, THERE IS NO DISPLAY FUNCTION NG ISSUE OCCURRED.



14.2 TESTING CONDITIONS AND INSPECTION CRITERIA

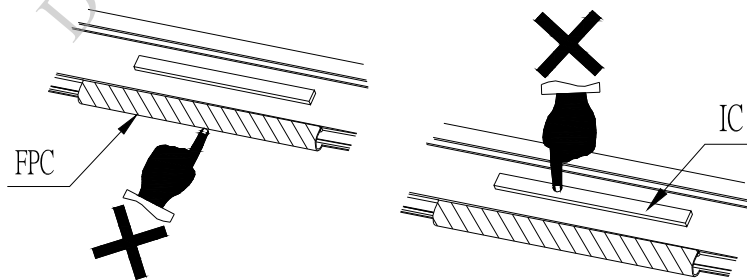
FOR THE FINAL TEST THE TESTING SAMPLE MUST BE STORED AT ROOM TEMPERATURE FOR 24 HOURS, AFTER THE TESTS LISTED IN TABLE 12.5, STANDARD SPECIFICATIONS FOR RELIABILITY HAVE BEEN EXECUTED IN ORDER TO ENSURE STABILITY.

NO.	ITEM	TEST MODEL	INSPECTION CRITERIA
1	CURRENT CONSUMPTION	REFER TO SPECIFICATION	THE CURRENT CONSUMPTION SHOULD CONFORM TO THE PRODUCT SPECIFICATION.
2	CONTRAST	REFER TO SPECIFICATION	AFTER THE TESTS HAVE BEEN EXECUTED, THE CONTRAST MUST BE LARGER THAN HALF OF ITS INITIAL VALUE PRIOR TO THE TESTS.
3	APPEARANCE	VISUAL INSPECTION	DEFECT FREE

15. CAUTION

15.1 OPERATION

- 15.1.1 DO NOT CONNECT OR DISCONNECT MODULES TO OR FROM THE MAIN SYSTEM WHILE POWER IS BEING SUPPLIED.
- 15.1.2 USE THE MODULE WITHIN SPECIFIED TEMPERATURE ; LOWER TEMPERATURE CAUSES THE RETARDATION OF BLINKING SPEED OF THE DISPLAY ; HIGHER TEMPERATURE MAKES OVERALL DISPLAY DISCOLOR. WHEN THE TEMPERATURE RETURNS TO NORMALITY, THE DISPLAY WILL OPERATE NORMALLY .
- 15.1.3 ADJUST THE LC DRIVING VOLTAGE TO OBTAIN THE OPTIMUM CONTRAST.
- 15.1.4 POWER ON SEQUENCE INPUT SIGNALS SHOULD NOT BE SUPPLIED TO LCD MODULE BEFORE POWER SUPPLY VOLTAGE IS APPLIED AND REACHES THE SPECIFIED VALUE .  
IF ABOVE SEQUENCE IS NOT FOLLOWED , CMOS LSIS OF LCD MODULES MAY BE DAMAGED DUE TO LATCH - UP PROBLEM .
- 15.1.5 NOT ALLOWED TO INFLICT ANY EXTERNAL STRESS AND TO CAUSE ANY MECHANICAL INTERFERENCE ON THE BENDING AREA OF FPC DURING THE TAIL BENDING BACKWARDS!  
DO NOT STRESS FPC AND IC ON THE MODULE!



## 15.2 HANDLING

- 15.2.1 USE A GROUNDED SOLDERING IRON WHEN SOLDERING CONNECTOR I/O TERMINALS . FOR SOLDERING OR REPAIRING, TAKE PRECAUTION AGAINST THE TEMPERATURE OF THE SOLDERING IRON AND THE SOLDERING TIME TO PREVENT PEELING OFF THE THROUGH-HOLE-PAD .
- 15.2.2 DO NOT DISASSEMBLE . EDT SHALL NOT BE HELD RESPONSIBLE IF THE MODULE IS DISASSEMBLED AND UPON THE REASSEMBLY THE MODULE FAILED .
- 15.2.3 DO NOT CHARGE STATIC ELECTRICITY , AS THE CIRCUIT OF THIS MODULE CONTAINS CMOS LSIS. A WORKMAN'S BODY SHOULD ALWAYS BE STATIC-PROTECTED BY USE OF AN ESD STRAP. WORKING CLOTHES FOR SUCH PERSONNEL SHOULD BE OF STATIC-PROTECTED MATERIAL .
- 15.2.4 ALWAYS GROUND THE ELECTRICALLY-POWERED DRIVER BEFORE USING IT TO INSTALL THE LCD MODULE. WHILE CLEANING THE WORK STATION BY VACUUM CLEANER, DO NOT BRING THE SUCKING MOUTH NEAR THE MODULE ; STATIC ELECTRICITY OF THE ELECTRICALLY-POWERED DRIVER OR THE VACUUM CLEANER MAY DESTROY THE MODULE .
- 15.2.5 DON'T GIVE EXTERNAL SHOCK.
- 15.2.6 DON'T APPLY EXCESSIVE FORCE ON THE SURFACE.
- 15.2.7 LIQUID CRYSTAL IN LCD IS HAZARDOUS SUBSTANCE. MUST NOT LICK AND SWALLOW.  
WHEN THE LIQUID IS ATTACH TO YOUR, SKIN, CLOTH ETC.  
WASH IT OUT THOROUGHLY AND IMMEDIATELY.
- 15.2.8 DON'T OPERATE IT ABOVE THE ABSOLUTE MAXIMUM RATING.
- 15.2.9 STORAGE IN A CLEAN ENVIRONMENT, FREE FROM DUST, ACTIVE GAS, AND SOLVENT.
- 15.2.10 STORE WITHOUT ANY PHYSICAL LOAD.
- 15.2.11 REWIRING: NO MORE THAN 3 TIMES.